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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

NATALINI, JEFF WILLIAM

ART UNIT PAPER NUMBER

2858

DATE MAILED: 05/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/708,775

Applicant(s)

HALL ET AL.

Examiner

Jeff Natalini

Art Unit

2858

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) 22-27 and 36-42 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-21 and 28-35 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☒ Claim(s) 1-42 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>3/24/04</u> | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-21 and 22-27, drawn to an apparatus for testing electromagnetic connectivity in a transmission path in a drill string, classified in class 324, subclass 642.
 - II. Claims 1-21 and 28-35, drawn to drawn to apparatus for testing drill string, classified in class 324, subclass 637.
 - III. Claims 1-21 and 36-42, drawn to an apparatus for testing electromagnetic connectivity, classified in class 367, subclass 82.
2. Claims 1 and 14 link(s) inventions I, II, and III. The restriction requirement among the linked inventions is subject to the nonallowance of the linking claim(s), claims 1 and 14. Upon the allowance of the linking claim(s), the restriction requirement as to the linked inventions shall be withdrawn and any claim(s) depending from or otherwise including all the limitations of the allowable linking claim(s) will be entitled to examination in the instant application. Applicant(s) are advised that if any such claim(s) depending from or including all the limitations of the allowable linking claim(s) is/are presented in a continuation or divisional application, the claims of the continuation or divisional application may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application. Where a restriction requirement is withdrawn, the provisions of 35 U.S.C. 121 are no longer applicable. *In*

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re Ziegler, 44 F.2d 1211, 1215, 170 USPQ 129, 131-32 (CCPA 1971). See also MPEP § 804.01.

Inventions I, II, and III are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct from each other if they are shown to be separately usable. In the instant case, invention I has a coil wherein the test signal is transmitted into the drill string and would be usable from far distance as a coil will be more receptive. In the instant case, invention II contains a testing apparatus that is electromagnetically coupled to the transmission path and has separate utility as a user can be holding the testing apparatus which transmits wirelessly to the transmission path of the drill string. In the instant case, invention III contains a downhole local area network and a computing apparatus to receive the data, and would be able to transmit the data to many different devices/users on the LAN. See MPEP § 806.05(d).

During a telephone conversation with Jeffery Daly on April 22, 2005 a provisional election was made without traverse to prosecute invention II, claims 1-21 and 28-25. Affirmation of this election must be made by applicant in replying to this Office action. Claims 22-27 and 36-42 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Specification

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is

requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

4. Claims 4, 5, 20, 30, 33, and 35 are objected to because of the following informalities:

- In regard to claims 4, 5, and 30, "electromagnetically" is misspelled, should be corrected to electromagnetically.
- In regard to claim 20, there is no antecedent basis for "the signal processor" it will be examined as if a signal processor was introduced in this claim.
- In regard to claim 33, "for" after comprises: should be deleted for grammar reasons.
- In regard to claim 35, in the last two lines it reads "the reflection to the test signal" this is unclear as to what it means, but examiner thinks that there was a typo and should read "the reflection of the test signal" and will be examined accordingly.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 3-5, 11, 14, 28, 29, and 32 are rejected under 35 U.S.C. 102(b) as being anticipated by Tanigushi et al. (5568448).

In regard to claims 1, 3, 14, and 28, Taniguish et al. teaches an apparatus/method for testing electromagnetic connectivity in a drill string (col 24 line 48-65): a drill string (fig 9 or 10 (device 4 through to the bit)) with a transmission path in the drill string (path through string in both figs 9 and 10); a signal generator/test apparatus (fig 10 (10)) electromagnetically coupled to the transmission path (fig 10, col 11 line 63-65); a receiver for reflection of the test signal (col 22 line 63-col 23 line 2) and determining from the reflection whether there is an interruption in the electromagnetic connectivity in the transmission path (col 24 line 60-64, defects mentioned here as known in the art would be discontinuities or disconnections based on the reflected wave characteristics compared to the reflection of a wave at known non error conditions).

In regard to claim 4 and 5, Taniguish et al. discloses transmitting the test signal across a plurality (would include the specifics of a single joint) of electromagnetically coupled joints (fig 10 shows a joint between magnetostriction generator and the drill string, and many coupled joints throughout the drill string in fig 9 or 10 are similar to those shown by applicant in fig 1).

In regard to claim 11, Taniguish et al. generates the test signal (col 10 line 21-25).

In regard to claim 13, Taniguish et al. implies that there is an indication of an interruption of the electromagnetic connectivity in the transmission path (col 24 line 62-64, states that the defects are diagnosed (identified), inspected and monitored; performing the inspection/monitoring is an indication that the defect is identified.

In regard to claim 29, Taniguish et al. discloses the drill sting includes a section of a drill bit (fig 9, the very bottom of the drill string shows a drill bit).

In regard to claim 32, Taniguish et al. discloses the testing apparatus is hosted on a non-dedicated portion of the pipe (fig 10, the testing apparatus (10) is hosted outside of the drill string).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 2, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanigushi et al. (5568448).

Tanigushi et al. in his invention does not use a sine wave while transmitting a test signal.

Tanigushi et al. teaches that it is known in the art to use a sine wave signal (fig 7(1) and 7(2)) while transmitting a test signal with a crystal based oscillator (col 3 line 60-col 4 line 9).

It would have been obvious to one with ordinary skill in the art at the time the invention was made for Taniguishi et al. to incorporate a crystal based oscillator producing a sine wave in order for the ultrasonic vibration to have a longitudinal wave and a transverse wave.

9. Claims 6-10, 12-13, 19-21, 30, 31, 33, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanigushi et al. (5568448) in view of Pacault et al. (Pub 2005/0046591).

Taniguish et al. discloses as noted above in claims 1, 14, and 28.

Taniguishi et al. lacks specifically stating :

- wherein receiving the reflection includes indicating one of a good connection or a bad connection in the drill string (claim 6);
- wherein receiving the reflection indicating a bad connection/determining an interruption includes receiving a signal indicating on of shorted box end, an open box end, a shorted pin end, or an open pen end (claims 7 and 8);
- wherein determining an interruption includes a signal processor that compares the reflection to a reference (claims 9 and 19);
- wherein determining comparing the reflection includes electronically comparing the reflection to a reference (claim 10);
- wherein the reflection is displayed before the determination (claim 12);

- wherein there is an indication of (or means for indicating) an interruption of the electromagnetic conductivity (claim 13 and 21);
- wherein there is a signal processor has a programmed computing apparatus (claim 20);
- wherein the transmission path includes: a first pair of electromagnetic couplers, a first conductor electrically connecting the first pair of electromagnetic couplers, a second conductor and a second pair of electrically magnetic couplers connected by the second conductor, one of the second pair of couplers being electromagnetically coupled to one of the first pair of couplers (claim 30);
- wherein the testing apparatus comprises a dedicated section of the drill string (claim 31);
- wherein means for determining from the reflection whether there is an interruption in the electromagnetic connectivity in the transmission path (claim 33);
- wherein the system has a downhole local area network over which the testing apparatus can transmit the data representing the reflection of the test signal (claim 35).

Pacault et al. discloses:

- wherein receiving the reflection includes indicating one of a good connection or a bad connection in the drill string (last sentence of paragraph determines existence of fault (bad=existence, good= no fault));

- wherein receiving the reflection indicating a bad connection/determining an interruption includes receiving a signal indicating on of shorted box end, an open box end, a shorted pin end, or an open pen end (abstract- "the fault in the wired drill pipe telemetry system is identified" the identity would tell if its is a shorted box, open box, etc... as errors stated in para [5]);
- wherein determining an interruption includes a signal processor that compares the reflection to a reference (para [12] last sentence);
- wherein determining comparing the reflection includes electronically comparing the reflection to a reference (para [12] last sentence);
- wherein the reflection is displayed before the determination (figs 20-23 display the reflected pulse- para [24]);
- wherein there is an indication of (or means for indicating) an interruption of the electromagnetic conductivity (para [48], explains after a fault is indicated it must be identified)
- wherein there is a signal processor has a programmed computing apparatus (para [36] last sentence);
- wherein the transmission path includes: a first pair of electromagnetic couplers, a first conductor electrically connecting the first pair of electromagnetic couplers, a second conductor and a second pair of electrically magnetic couplers connected to the second conductor, one of the second pair of couplers being electromagnetically coupled to one of

the first pair of couplers (conductors 21 and 31 (fig 2) are connected through conductors 5a, 5b (fig 1) and the drill string could have many couplers between pipes (para [31-32]) also Pacault et al. states that these couplers could all be magnetic couplers also (para [39]) and would be coupled together to transmit proper signals);

- wherein the testing apparatus comprises a dedicated section of the drill string (fig 1 and claim 23 instill how the testing apparatus is a part of the drill string);
- wherein means for determining from the reflection whether there is an interruption in the electromagnetic connectivity in the transmission path (abstract last sentence);
- wherein the system has a downhole local area network over which the testing apparatus can transmit the data representing the reflection of the test signal (para [29]).

It would have been obvious to one with ordinary skill in the art at the time the invention was made for Tanigushi et al. to incorporate the above limitations in a drill bit detection system/method as taught by Pacalut et al. in order to test the reliability of conductive wires forming a wired drill pipe and quickly identify any failure (para [4]).

10. Claims 17 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanigushi et al. (5568448) in view of Meador et al. (4785247).

Tanigushi et al. lacks wherein at least one of the generator and receiver includes a coil through which a test signal is generated by the signal generator and transmitted into the drill string.

Meador et al. teaches wherein the transmitter (in this case transmitter is passing signal through for measuring formation parameter in drill string) and receiver have coils (fig 7 (119,122)) and coil are arranged in the drill string to transmit signals through (abstract).

It would have been obvious to one with ordinary skill in the art at the time the invention was made for Tanigushi to have a coil the generator and receiver (though the claim only needs a coil in one) and have a coil through which the signal generated by the signal genitor transmits into a drill string as taught by Meador et al. in order to allow for efficient propagation and reception.

11. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanigushi et al. (5568448) and Meador et al. (4785247) in view of Spikerman (4314479).

Taniguishi et al. as modified discloses as above.

Taniguishi et al. as modified lacks wherein the coil of the signal generator and the receiver is shared.

Spikerman teaches wherein a generator and receiver share a coil in an apparatus for transmitting and receiving electromagnetic pulses (col 6 line 58-62).

It would have been obvious to one with ordinary skill in the art at the time the invention was made for Taniguishi et al. as modified to have the generator and receiver share a coil as taught by Spikerman in order to lower design area and cost.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Cram et al. (5631562) teaches using TDR on a drill string, has a computer on surface to store and analyze the acquired data. Tabanou et al. (6426917) teaches transmitting a wave through a coil into the drill string.

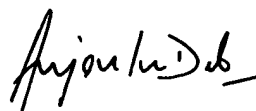
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff Natalini whose telephone number is 571-272-2266. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lefkowitz can be reached on 571-272-2180. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jeff Natalini




ANJAN DEB
PRIMARY EXAMINER